

WHAT IS CLAIMED IS:

- 1 1. A method comprising:  
2 providing a DC voltage signal;  
3 utilizing a first switching circuit (104) to switch said DC voltage signal so as to  
4 produce relative to a reference voltage a positive pulse width modulated voltage signal for  
5 about one half of a fundamental output period;
- 6 utilizing a second switching circuit (204) to switch said DC voltage signal  
7 so as to produce relative to said reference voltage a negative pulse width modulated  
8 voltage signal for about one half of said fundamental output period.
- 1 2. The method as described in claim 1 and further comprising:  
2 reversing the polarity of said DC voltage signal after switching said DC  
3 voltage signal for about one half of said fundamental output period.
- 1 3. The method as described in claim 2 and further comprising utilizing said first  
2 switching circuit (104) to reverse the polarity of said DC voltage signal.
- 1 4. The method as described in claim 2 and further comprising utilizing said second  
2 switching circuit (204) to reverse the polarity of said DC voltage signal.
- 1 5. The method as described in claim 1 and further comprising:  
2 utilizing a two switch network (SW11, SW12) as said first switching circuit;  
3 electrically coupling said two switch network in parallel with said DC voltage  
4 signal;  
5 utilizing a two switch network (SW21, SW22) as said second switching circuit;  
6 electrically coupling said two switch network of said second switching circuit in  
7 parallel with said DC voltage signal;
- 8 configuring an output (108) between said two switch network of said first  
9 switching circuit and said two switch network of said second switching circuit.
- 1 6. An apparatus comprising:  
2 an input (108) to receive a DC voltage signal;  
3 a first switching circuit (104) configured to modulate said DC voltage signal so as  
4 to produce relative to a reference voltage a positive pulse width modulated voltage signal  
5 for about one half of a fundamental output period;

6 a second switching circuit (204) configured to modulate said DC voltage  
7 signal so as to produce relative to said reference signal a negative pulse width modulated  
8 voltage signal for about one half of said fundamental output period.

1 7. The apparatus as described in claim 6 and further comprising a circuit  
2 operable to reverse the polarity of said DC voltage signal.

1 8. The apparatus as described in claim 7 wherein said first switching circuit  
2 (104) is operable to reverse the polarity of said DC voltage signal.

1 9. The apparatus as described in claim 7 wherein said second switching  
2 circuit (204) is operable to reverse the polarity of said DC voltage signal.

1 10. The apparatus as described in claim 6 wherein said first switching circuit  
2 comprises a two switch network in parallel with said DC voltage signal and wherein said  
3 second switching circuit comprises a two switch network in parallel with said DC voltage  
4 signal; and further comprising an output (108) electrically coupled between said two  
5 switch network of said first switching circuit and said two switch network of said second  
6 switching circuit.

1 11. An apparatus for providing a pulse width modulated voltage signal, said  
2 apparatus comprising:

3 an input (107) to receive a DC voltage signal;

4 a first switching circuit (104) electrically coupled to said input so as to be  
5 electrically coupled to said DC voltage signal during operation;

6 a second switching circuit (204) electrically coupled to said input so as to be  
7 electrically coupled to said DC voltage signal during operation;

8 wherein said first switching circuit (104) is operable to produce a positive pulse  
9 width modulated output signal relative to a reference voltage; and

10 wherein said first switching circuit (104) is operable to reverse the polarity  
11 of said DC voltage signal applied to a load during operation.

1 12. The apparatus as described in claim 11 wherein said second switching  
2 circuit (204) is operable to produce a negative pulse width modulated output signal  
3 relative to said reference voltage.

1 13. The apparatus as described in claim 12 wherein said second switching  
2 circuit (204) is operable to reverse the polarity of said DC voltage signal.

1 14. The apparatus as described in claim 11 wherein said first switching circuit  
2 comprises a first switch and a second switch, said first switch and second switch operable

3 to reverse said polarity of said DC voltage signal when said first switch is placed in a  
4 conducting state and said second switch is placed in a non-conducting state.

1 15. The apparatus as described in claim 11 wherein said input is electrically  
2 coupled in parallel with said first switching circuit and said second switching circuit.

1 16. A method of providing a pulse width modulated output voltage signal, said  
2 method comprising:

3 providing a DC voltage signal;

4 providing a first switching circuit (104) electrically coupled to said DC voltage  
5 signal;

6 providing a second switching circuit (204) electrically coupled to said DC voltage  
7 signal;

8 operating said first switching circuit (104) to produce a positive pulse width  
9 modulated output signal relative to a reference voltage;

10 operating said first switching circuit to reverse the polarity of said positive  
11 pulse width modulated output signal once during a fundamental output period.

1 17. The method as described in claim 16 and further comprising:

2 operating said second switching circuit to produce a negative pulse width  
3 modulated output signal relative to said reference voltage.

1 18. The method as described in claim 17 and further comprising:

2 operating said second switching circuit (204) to reverse the polarity of said  
3 output signal.

1 19. The method as described in claim 16 wherein said first switching circuit  
2 (104) comprises a first switch and a second switch, said method further comprising:

3 reversing the polarity of said positive pulse width modulated output signal  
4 by maintaining said first switch in a non-conducting state while maintaining said second  
5 switch in a conducting state.

1 20. The method as described in claim 16 and further comprising:

2 electrically coupling said DC voltage signal in parallel with said first switching  
3 circuit; and

4 electrically coupling said DC voltage signal in parallel with said second  
5 switching circuit.

1           21.     An apparatus to generate a pulse width modulated voltage signal, said  
2     apparatus comprising:  
3           a DC voltage source (102);  
4           a first switching circuit (104) comprising a first switch and a second switch  
5     configured in a series circuit, said first switching circuit electrically coupled in parallel  
6     with said DC voltage source;  
7           a second switching circuit (204) comprising a third switch and a fourth switch  
8     configured in a series circuit, said second switching circuit electrically coupled in parallel  
9     with said DC voltage source;  
10           an output (108) comprising a first electrical junction coupling said first  
11     switch with said second switch and a second electrical junction coupling said third switch  
12     with said fourth switch;  
13           said second switching circuit (204) operable to maintain said third switch in a  
14     conducting state while said fourth switch is maintained in a non-conducting state so as to  
15     establish a first polarity of an output signal;  
16           said first switching circuit operable to switch said first switch and said second  
17     switch at a modulation frequency;  
18           said first switching circuit operable to maintain said second switch in a conducting  
19     state while maintaining said first switch in a non-conducting state so as to establish a  
20     second polarity of said output signal, said second polarity being the reverse polarity of  
21     said first polarity; and  
22           said second switching circuit operable to switch said third switch and said  
23     fourth switch at said modulation frequency.

1           22.     The apparatus as described in claim 21 wherein said first switching circuit  
2     and said second switching circuit are configured as part of an application specific  
3     integrated circuit.

1           23.     The apparatus as described in claim 21 wherein said first switching circuit  
2     (104) is operable to produce a positive pulse width modulated output signal during about  
3     one half cycle of a fundamental output period; and

4           wherein said second switching circuit (204) is operable to produce a  
5     negative pulse width modulated output signal during the other half cycle of said  
6     fundamental output period.

1           24.     The apparatus as described in claim 21 and further comprising a motor  
2     electrically coupled to said output.

1           25.     The apparatus as described in claim 21 and further comprising a  
2     microprocessor electrically coupled to said first switching circuit and to said second  
3     switching circuit, said microprocessor operable to control said first switching circuit and  
4     said second switching circuit.

1           26.     A method of generating a pulse width modulated voltage signal, said  
2     method comprising:

3                 providing a DC voltage source (102);

4                 electrically coupling said DC voltage source in parallel with a first switching  
5     circuit (104) comprising a first switch and a second switch configured in a series circuit;

6                 electrically coupling said DC voltage source in parallel with a second switching  
7     circuit (204) comprising a third switch and a fourth switch configured in a series circuit;

8                 establishing an output (108) comprising a first electrical junction coupling said  
9     first switch and said second switch and a second electrical junction coupling said third  
10    switch and said fourth switch;

11                maintaining said third switch in a conducting state while maintaining said  
12    fourth switch in a non-conducting state so as to establish a first polarity of an output  
13    signal;

14                switching said first switch and said second switch at a modulation frequency; then  
15                maintaining said second switch in a conducting state while maintaining said first  
16    switch in a non-conducting state so as to establish a second polarity of said output signal,  
17    said second polarity being the reverse polarity of said first polarity;

18                switching said third switch and said fourth switch at said modulation  
19    frequency.

1           27.     The method as described in claim 26 and further comprising:

2                 configuring said first switching circuit and said second switching circuit as  
3     part of an application specific integrated circuit.

1           28.     The method as described in claim 26 and further comprising:

2                 utilizing said first switching circuit to produce a positive pulse width modulated  
3     output signal during about one half cycle of a fundamental output period; and

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4                   utilizing said second switching circuit to produce a negative pulse width  
5 modulated output signal during the other half cycle of said fundamental output period.

1           29.     The method as described in claim 26 and further comprising powering a  
2 motor with said output signal.

1           30.     The method as described in claim 26 and further comprising controlling  
2 said first switching circuit and said second switching circuit with a processor.

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